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ACCIDENT PREVENTION MEASURES AT THE MOCTEZUMA COPPER COMPANY[1]

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INTRODUCTION

The Moctezuma Copper Company, at Pilares, Sonora, Mexico, is making a noteworthy record in the prevention of accidents. In connection with an intensive educational campaign and systematic inspection many safety measures have been adopted which have proved of value.

MINING SYSTEM

The country rock is latite and andesite. The ore bodies occur around the rim of an oval about 1,200 feet long and 450 feet across in reconsolidated brecciated country rock. The mine is developed by means of shafts. The ore is now being mined mostly by inclined-rill, horizontal cut-and-fill, and square-set stopes. The ore is harder in the lower levels than in those nearer the surface, and most of the new stopes are being opened to be mined by the rill system. Six-foot cuts are taken at a time. Rounds are drilled with a new mounted, fast-drilling, light-weight Leyner-type machine. Stopers are used in the raises only. No dry drilling is done in the mines; if for any reason water is not available, all drilling ceases until it is available.

Practically all work at the mine is done under contract. Even hoist engineers are employed under this system. Each stope or development face is given to a contractor, who hires his own men with the approval of the foreman. Each division foreman gives the contracts and sets the unit rate for the work done for his part of the mine, based on the standard wage-scale.

ACCIDENT RATE

In 1925, three fatalities and 275 lost-time accidents occurred. During that year a concerted effort was started to reduce the number of accidents; in 1926 there were four fatalities and 78 lost-time accidents. Twenty-seven of these accidents caused more than two weeks and 51 less than two weeks lost time. Although the fatalities increased by one the total number of accidents was less than a third of the number for 1925. A total of 428,905 shifts was worked in 1926. Seven accidents, including one fatality, occurred in January, 1927; one

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accident in February; none in March, and one in April. The total number of accidents for 1927 was only a little more than half the number for 1926. No lost-time accidents occurred at the concentrating plant for over three years.

ACCIDENT-PREVENTION MEASURES

To keep the accident rate to a minimum at a mine it is necessary that the management be convinced that most if not all accidents can be prevented. Once the executives of a mine have determined to reduce the accident rate the next move is to convert the bosses to the idea of accident prevention, install safeguards, and change unsafe practices. The men can then be educated to do their work in a safe manner, and generally such education is largely a matter of discipline.

Safety rules are established at the Moctezuma mine, and in general are enforced. Workmen and bosses with good safety records receive extra consideration, while violators of safety rules are disciplined. The company gives a fiesta or holiday with suitable entertainment to the workmen whenever a 30-day period is completed underground without a lost-time accident.

Mining operations at this mine are planned to afford a maximum of safety to the workers; and only too frequently this phase of accident prevention in mines is ignored. Safeguards are installed where needed, the cause of each individual accident is studied, mining practices are improved where they are found deficient, and rules are established to prevent insofar as feasible recurrence of any particular type of accident.

The Moctezuma is a clean mine. Ladderways and drifts are kept in safe condition and free from broken or loose rock, ditches are kept clean, and no trash is allowed to accumulate underground. All timber and other supplies are promptly stored or utilized after being lowered. These and other similar measures undoubtedly have a favorable influence on maintaining a low accident rate.

Falls of Rock

Accidents from falls of rock are the most frequent in this mine; however, the rate has been greatly reduced by supervising the contractors more closely and requiring them to safeguard their workers by teaching them safe methods of work and the use of available safe equipment and devices.

The men on stope contracts are paid by the number of cars taken from the stope or for the cubic meters of ground broken. In addition, they are paid a contract price for placing cribs or stulls for supporting the back, as well as for building chutes, sorting ore, and other necessary operations looking to safety and efficiency. The facts that the company pays for work done to make the stopes safe and that time thus spent does not reduce the contractor's earnings are decidedly important in preventing accidents from falls of roof in the stopes of this mine. In this manner much of the objection to the contract system as to its effect on safety is overcome; in fact, under the system in vogue in this mine the individual worker is paid extra to enhance his own safety and that of fellow workers.

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Hard-Boiled Hats

No one -- miner, manager, or visitor -- is allowed to go underground unless he is wearing the so-called "hard-boiled" hat. The company furnishes these hats to the men for 50 cents each and replaces damaged ones free of cost. This order has been in effect for over a year and, should it be rescinded, nearly all of the men would undoubtedly continue to wear such hats anyway. There is no question that compulsory use of the "hard-boiled" hat has had a decided influence toward reducing accidents from falls of rock.

On April 8, 1927, a piece of ore weighing 87 pounds fell through the top lagging in a square-set stope for a distance of 4 feet and struck a miner on the top of his head. The hat was crushed but the man's head was uninjured. Two weeks later he was still in the hospital with a sprained and stiff neck, but he was expected soon to be released. Seven other crushed hats are exhibited in a case near the collar of the shaft; each hat saved its wearer from a serious accident and at least one preserved his life.

Haulage

In most mines haulage accidents seem to be among the most difficult to prevent. At Pilares tracks and equipment are kept in good condition. The motors are equipped with bells, and the haulageways are large enough to allow a man to stand in the clear while trains are passing. A man afoot precedes all trains that are being pushed by motor.

Goggles

Eye accidents have been largely eliminated by the compulsory use of goggles. Every man whose duties are such that he might receive an eye injury must have a pair of goggles either around his neck or on his hat before he is lowered into the mine. Three pairs of goggles, which undoubtedly saved three men an eye each, are exhibited in a case near the shaft. In 1924, before the use of goggles was made compulsory, 102 eye accidents occurred; in 1926 there were only two such accidents, and undoubtedly the compulsory widespread use of goggles in the mine is responsible for practically all of the 1926 decrease in eye accidents.

Loading Chutes

The most common accident at loading chutes is crushed hands or fingers, and almost wholly with a view to reducing these accidents a second or safety gate is provided at Pilares on all loading chutes. The lower gate is opened to draw the chute; the second gate does not unduly retard the flow of ore but rides on top of the moving stream of ore and catches all flying particles, the ones which are most likely to cause accidents to the chute loaders. All chutes are drawn from platforms above the level of the top of the cars, and unquestionably the second gate on the chute has been the means of preventing a number of hand injuries.

Safety Belts

In this property it is not necessary that an accident shall occur before measures are taken to improve any operation in the mine that appears unsafe. Although no accidents had occurred in the gloryhole -- which furnished waste filling

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in the mine -- the general superintendent issued an order that safety belts must be worn by all men working in the pit. Within six months a man fell, and undoubtedly his life was saved by the use of the belt.

CONCLUSIONS

The achievement in safety at the Moctezuma mine proves that accident rates can be held to a minimum when an intelligent and concerted effort is made to do so. Also it would appear that the class of labor employed does not have an important bearing on the frequency of the accidents and that excellent safety records can be obtained under the contract system of paying for work done, provided the contract system includes pay for safety work as well as for work in connection with production. - Information Circular, Bureau of Mines, Department of Commerce.

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